

AREA OF STEEL REQUIRED FOR "J5" BARS IN WINGS (sq. in./ft.)													
BARREL HEIGHT VS. WALL THICKNESS													
WALL THICKNESS "TX" (in.)		BARREL HEIGHT (ft.)											
8	0.1683	0.1683	0.1699	0.2502	0.2677								
9	0.1683	0.1683	0.1683	0.2111	0.2680	0.3071	0.4101	0.5366					
10	0.1683	0.1683	0.1683	0.1821	0.2573	0.2867	0.3510	0.4573	0.5856	0.7393			
11		0.1683	0.1683	0.1683	0.2260	0.3061	0.3073	0.3992	0.5095	0.6405	0.7954	0.9780	
12			0.1683	0.2016	0.2748	0.3259	0.3546	0.4515	0.5661	0.7007	0.8580	1.0413	
13				0.1820	0.2479	0.3285	0.3461	0.4058	0.5078	0.6271	0.7658	0.9262	
14					0.2259	0.2990	0.3665	0.3687	0.4608	0.5681	0.6924	0.8355	
15						0.2745	0.3550	0.3871	0.4219	0.5195	0.6323	0.7617	
16							0.4078	0.4078	0.4788	0.5821	0.7004		
17								0.3863	0.4286	0.4442	0.5396	0.6486	
18									0.4495	0.4495	0.5029	0.6041	
19									0.4705	0.4711	0.5654		
20										0.4915	0.5316		

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BARREL HEIGHT VS. WALL THICKNESS													
WALL THICKNESS "TX" (in.)		BARREL HEIGHT (ft.)											
8	0.1683	0.1683	0.1683	0.1683	0.2280								
9	0.1683	0.1683	0.1683	0.1683	0.1917	0.2617	0.2680	0.3393					
10	0.1683	0.1683	0.1683	0.1683	0.1683	0.2255	0.2867	0.2911	0.3708	0.4651			
11		0.1683	0.1683	0.1683	0.1683	0.1982	0.2626	0.3061	0.3244	0.4059	0.5012	0.6119	
12			0.1683	0.1683	0.1683	0.1769	0.2342	0.3030	0.3259	0.3605	0.4443	0.5412	0.6527
13				0.1683	0.1683	0.2113	0.2732	0.3461	0.3461	0.3993	0.4857	0.5846	
14					0.1683	0.1926	0.2489	0.3155	0.3665	0.3665	0.4408	0.5299	
15						0.1769	0.2285	0.2895	0.3608	0.3871	0.4037	0.4848	
16							0.2676	0.3333	0.4078	0.4078	0.4470		
17								0.2488	0.3098	0.3803	0.4286	0.4286	
18									0.2893	0.3551	0.4303	0.4495	
19										0.3330	0.4035	0.4705	
20										0.3799	0.4551		

NOTE: IF AREA OF STEEL IN THE WALL OF THE CULVERT (J4 Bars) IS GREATER THAN THAT INDICATED IN THE TABLE, USE THE SAME SIZE AND SPACING FOR THE "J5" BARS IN THE WINGS. HOWEVER, IF THE AREA OF STEEL PROVIDED BY MATCHING SIZE AND SPACING OF THE "J4" BARS IS INSUFFICIENT, INCREASE THE SIZE OF THE "J5" BARS (#8 Max.) AND/OR DECREASE THE SPACING OF THE "J5" BARS (6" Min.). USE SMALLEST BAR SIZE POSSIBLE BASED ON MINIMUM SPACING.

MINIMUM STEEL TO BE USED IN THE WINGS FOR "J5" BARS IS #4 BARS AT 14" CENTERS (As = 0.1683 sq. in./ft.)

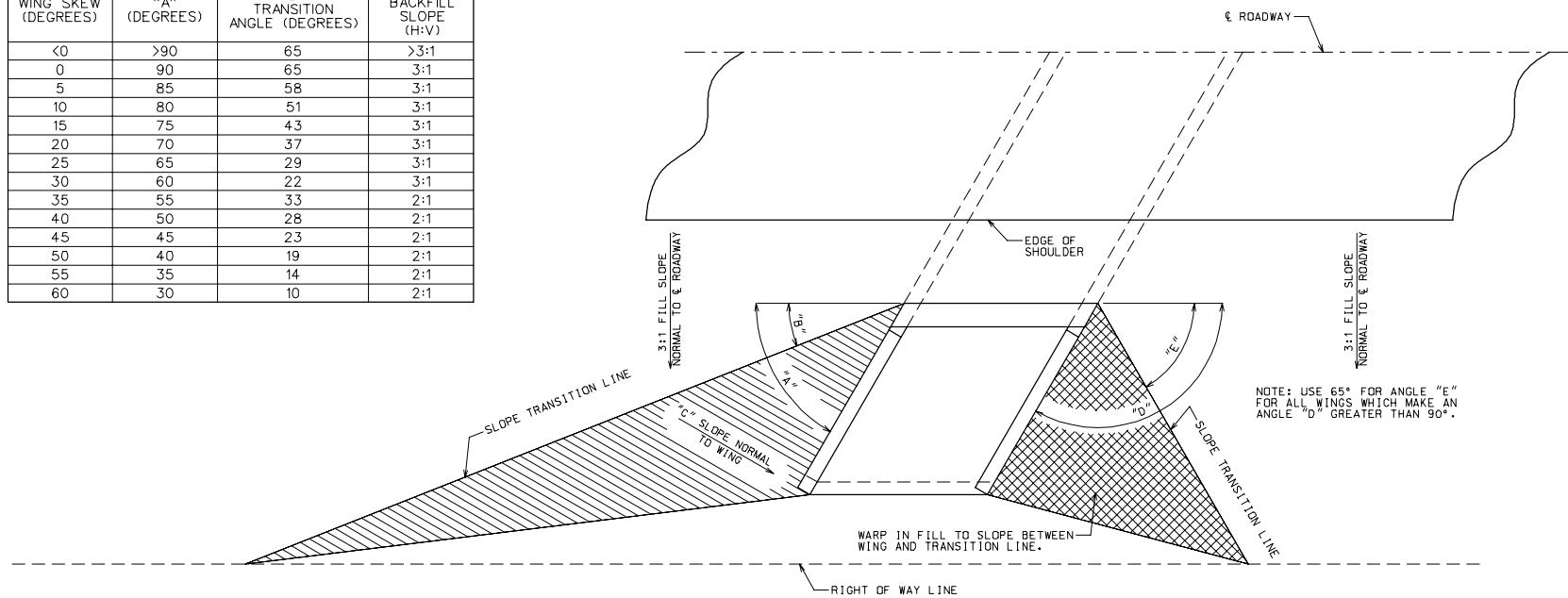
* SEE STANDARD PLAN 703.37B, SHEET 2 OF 2 FOR BACKFILL SLOPE TO BE USED BASED ON SKEW.

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION

CONCRETE BOX CULVERT
EXTERIOR WING REINFORCEMENT
(HS20 & HS20 MOD. LOADING)

DATE:	EFFECTIVE: 04-01-2001	703.37B	1
2			

WING BACKFILL TABLE			
WING SKEW (DEGREES)	"A" (DEGREES)	"B" TRANSITION ANGLE (DEGREES)	"C" BACKFILL SLOPE (H:V)
<0	>90	65	>3:1
0	90	65	3:1
5	85	58	3:1
10	80	51	3:1
15	75	43	3:1
20	70	37	3:1
25	65	29	3:1
30	60	22	3:1
35	55	33	2:1
40	50	28	2:1
45	45	23	2:1
50	40	19	2:1
55	35	14	2:1
60	30	10	2:1



PLAN OF WINGS AND SLOPE TRANSITION LINES

NOTE: BACKFILL TRANSITION ANGLE AND BACKFILL SLOPE SHALL APPLY TO ALL BOX CULVERTS REGARDLESS OF TYPE - SINGLE, DOUBLE, OR TRIPLE.

MISSOURI HIGHWAY AND TRANSPORTATION COMMISSION	
CONCRETE BOX CULVERTS EXTERIOR WING BACKFILL SLOPE TRANSITION	
DATE: _____	EFFECTIVE: 04-01-2001

703.37B